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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the application of  
Aita et al.

For: **SELF-REPAIRING CERAMIC COATINGS**

Serial No.: 09/375,169

Filed: August 16, 1999

Atty. Docket No.: R0376-00100

Examiner: Jennifer C. McNeil

Group Art Unit: 1775

U.S. Patent No.: 6,869,701

Issue Date: March 22, 2005

**TRANSMITTAL**

**CERTIFICATE OF MAILING PURSUANT TO 37 C.F.R. §1.8**

I hereby certify that this paper is being deposited in the U.S. Postal Service as first class mail with sufficient postage addressed to Certificate of Corrections Branch, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on 3/28/2005, in San Francisco, CA.

By: [Signature]

Certificate of Corrections Branch  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Dear Sir:

1. Transmitted herewith for filing in the above-identified patent application are the following:

- ☒ Request For Certificate Of Correction Pursuant to 37 CFR §1.322(a) including:
  - ☒ copy of Amendment And Response To Office Action Mailed 06/30/2004 as filed October 12, 2004.
  - ☒ copy of Notice of Allowability mailed October 22, 2004.
- ☒ Certificate Of Correction (form PTO/SB/44); and
- ☒ Self-stamped return receipt postcard.

2. Payment of Fees Due

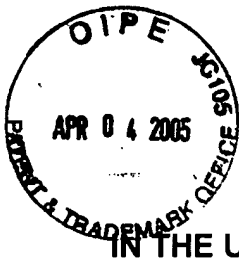
- ☒ Applicants believe that there is no fee due with this communication. However, should the Commissioner find otherwise, the Commissioner is authorized to charge any deficiencies if fees and to credit any overpayment of fees which may be required under 37 C.F.R. §1.16 or §1.17, to Deposit Account No 04-1679, referencing Atty. Docket No. R0376-00100. **A duplicate copy of this transmittal is enclosed for this purpose.**

Respectfully,

By: [Signature]

Edward J. Lynch  
Registration No. 24,422  
Attorney for Patentees

DUANE MORRIS LLP  
One Market, Spear Tower, Ste. 2000  
San Francisco, CA 94105  
Telephone: (415) 371-2200  
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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the application of	)	Examiner: Jennifer C. McNeil
Aita et al.	)	
	)	Group Art Unit: 1775
For: <b>SELF-REPAIRING CERAMIC</b>	)	
<b>COATINGS</b>	)	U.S. Patent No.: 6,869,071
	)	
Serial No.: 09/735,169	)	Issued: March 22, 2005
	)	
Filed: August 16, 1999	)	
	)	
Atty. Docket. No.: R0376-00100	)	

**CERTIFICATE OF MAILING PURSUANT TO 37 C.F.R. §1.8**

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By: [Signature]

**REQUEST FOR CERTIFICATE OF CORRECTION**

**PURSUANT TO 37 CFR §1.322(a)**

Certificate of Corrections Branch  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Dear Sir:

Applicants hereby request a Certificate of Correction to correct errors that occurred in claims 6, 21, and 23 in the patent, which were not made by applicants. Attached is Form PTO/SB/44, correcting the errors. In support of Applicants, attached are copies of the resubmission of Amendment And Response To Office Action Mailed 06/30/2004 as filed October 12, 2004 by Applicants amending claims in the above-identified application. That response was considered by the Patent Office and the amended claims in which the errors in the patent occurred were allowed by the Examiner as seen in the enclosed copy of the Notice of Allowability mailed October 22, 2004.

The columns and line numbers where the errors occurred in the patent are as follows:

**Column 9, line 7**, change "Inner" to --inner--;

**Column 10, line 35**, change "forted" to --formed--; and

Column 10, line 43, change "nanoscale" to --nano-scale--.

Please send the Certificate of Correction to:

Edward J. Lynch  
Duane Morris LLP  
One Market  
Spear Tower, Ste. 2000  
San Francisco, California 94105  
Direct Dial: 9415) 371-2267  
Fax: (415) 371-2201

The error was made by the Patent Office, therefore, the fee for the request is not enclosed. However, should the Patent Office find applicants to be in error, the Commissioner is authorized to charge the deficiencies in fees and to credit any overpayment for this request to Deposit Account No. 04-1679, referencing Atty. Docket No. R0376-00100.

Applicants respectfully request issuance of a Certificate of Correction.

Respectfully submitted,

By:   
Edward J. Lynch  
Registration No. 24,422  
Attorney for Patentees

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One Market  
Spear Tower, Suite 2000  
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Direct Dial: (415) 371-2267

**UNITED STATES PATENT AND TRADEMARK OFFICE  
CERTIFICATE OF CORRECTION**

PATENT NO. : 6,869,701

DATED : March 22, 2005

INVENTOR(S) : Aita et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

In Column 9, line 7:

Change "Inner" to --inner--.

In Column 10, line 35:

Change "forted" to --formed--.

In Column 10, line 43:

Change "nanoscale" to --nano-scale--.

**MAILING ADDRESS OF SENDER:**

Edward J. Lynch, Reg. No. 24,422  
Duane Morris LLP  
One Market, Spear Tower, Ste. 2000  
San Francisco, CA 94105

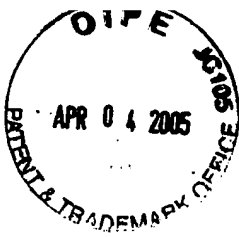
PATENT NO. 6,869,701

No. of additional copies

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This collection of information is required by 37 CFR 1.322, 1.323, and 1.324. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1.0 hour to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Attention Certificate of Corrections Branch, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.



## PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the application of  
Aita et al.

Examiner: J. C. McNeil

Group Art Unit: 1775

For: **SELF-REPAIRING CERAMIC COATING**

Serial No.: 09/375,169

Filed: August 16, 1999

Docket No.: R0376-00100

**AMENDMENT AND**  
**RESPONSE TO OFFICE**  
**ACTION MAILED 06/30/2004**

**CERTIFICATE OF MAILING PURSUANT TO 37 C.F.R. §1.8**

I hereby certify that this correspondence is being transmitted by facsimile to Examiner Jennifer C. McNeil (703) 872-9306, Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on 10/12/04, in San Francisco, CA.

By:

Mail Stop Amendment  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Dear Sir:

In response to the Office Action mailed June 30, 2004, please amend the above-referenced application as follows.

**IN THE CLAIMS:**

Please amend claim 1 as indicated in the following list of pending claims.

**PENDING CLAIMS**

1. (Currently Amended) An intracorporeal device having a protective self-repairing coating on a surface thereof, comprising:
  - a. an inner coating component which is on the surface of the device and which has at least one bilayer comprising a first layer formed of a first ceramic material and a second layer formed of a second ceramic material different from the first ceramic material; and
  - b. an outer coating component which is on the inner coating component and which has at least one layer less than 100 nm thick formed of nano-crystalline aluminum nitride that forms a water swellable material in an oxygen containing medium.
2. (Cancelled)
3. (Previously presented) The intracorporeal device of Claim 1 wherein the first and second ceramic materials are selected from the group consisting of zirconia, titania and alumina.
4. (Previously presented) The intracorporeal device of Claim 1 wherein the water swellable material is aluminum hydrate or aluminum hydroxide.
5. (Cancelled)
6. (Cancelled)

7. (Previously presented) The intracorporeal device of Claim 1 wherein individual bilayers of the inner coating component are about one to about 100 nanometers thick.

8. (Previously presented) The intracorporeal device of Claim 1 wherein the individual bilayers of the inner coating are about one to about 50 nanometers thick.

9. (Previously presented) The intracorporeal device of claim 1 wherein the inner coating component has at least one bilayer with zirconia in one layer and alumina in the other layer.

10. (Previously presented) The intracorporeal device of Claim 1 wherein the inner coating component has at least one bilayer with zirconia in one layer and titania in the other.

11. (Canceled)

12. (Previously presented) The intracorporeal device of Claim 1 wherein the inner component has a thickness of up to about a micron.

13. (Previously presented) The intracorporeal device of Claim 1 wherein each of the inner and outer coating components have a thickness in a range from about 1 to 50 nm.

14. (Previously presented) The intracorporeal device of Claim 1 wherein the at least one bilayer on the surface of the device includes a nano-scale hardness-imparting ceramic coating layer and a nano-scale toughness-imparting ceramic coating layer.

15. (Previously presented) The intracorporeal device of Claim 1 wherein each of the harness-imparting and the toughness-impairing coating layer has a thickness independently ranging from about 1 to about 100nm.

16. (Previously presented) The intracorporeal device of Claim 1 wherein the outer coating component has a thickness in the range from about 1 to less than 100 nm.

17. (Cancelled)

18. (Previously presented) A nanostructure protective self-repairing coating for a substrate, comprising

- a. an outer coating component which is less than 100 nm thick, which is formed of a nanocrystalline compound selected from the group consisting of aluminum nitride, zirconium nitride and hafnium nitride capable of forming a hydrate or hydroxide compound upon contact with an oxygen containing environment and
- b. an inner coating component secured to the substrate which is formed of at least one bilayer which has a first layer of a first ceramic material and a second layer of a second ceramic material that is different from the first ceramic material.

19. (Previously presented) The coating of Claim 18 wherein the compound of the outer coating component comprises aluminum nitride.

20. (Cancelled)

21. (Previously presented) An intracorporeal implant, comprising:  
a substrate selected from the group consisting of metals, polymers,



and a combination thereof; and

a protective coating thereon having a plurality of coating components comprising  
a first coating component having at least one bilayer wherein each layer is  
formed of a material selected from the group consisting of zirconia and alumina;

a second coating component disposed on the first coating component having at  
least one bilayer with each layer formed of a material selected from the group consisting  
of zirconia and titania; and

a third coating component disposed on the second coating component formed of  
a compound which has microcrystallinity and which is capable of forming a hydrate or  
hydroxide upon contact with an oxygen containing environment.

22. (Previously presented) The implant of claim 21 wherein the compound  
is an aluminum compound.

23. (Previously presented) The implant of claim 21 wherein the compound  
is an aluminum nitride.

24. (Previously presented) The implant of Claim 21 wherein the compound  
selected is aluminum nitride which forms aluminum hydroxide, aluminum hydrate, or  
mixtures thereof.

25. (Previously presented) The implant of Claim 21 wherein the coating  
thickness is in a range from about 1 to about 100 nanometers.

26. (Previously presented) The implant of Claim 21 wherein the coating  
thickness is in a range from about 1 to 50 nanometers.

27. (Cancelled)

28. (Currently Amended) An intracorporeal implant which has a substrate selected from the group consisting of metals, polymers, and a combination thereof,

- a. which has an inner coating component secured to the substrate with at least one bilayer formed of a first layer of a first ceramic material and a second layer of a second ceramic material different from the first ceramic material and
- b. which has a protective, self-repairing outer coating component having a thickness of less than 100 nm, having nano-crystallinity and ~~being formed at least in part of~~ comprising a ceramic material formed of a compound selected from the group consisting of aluminum nitride, zirconium nitride and hafnium nitride and capable of forming a hydrate or hydroxide compound upon contact with an oxygen containing environment.

29. (Canceled)

30. (Previously presented) The implant of Claim 28 wherein the compound is aluminum nitride.

31. (Cancelled)

32. (Cancelled)

33. (Previously presented) The implant of Claim 28 wherein the coating further includes a plurality of nano-scale ceramic bilayers including a hardness-imparting bilayer and a toughness-imparting bilayer.

## **REMARKS**

### **Response to Claim Rejections Under 35 U.S.C. §112**

Claims 28, 30 and 33 are rejected by the Examiner under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement. The above amendment to claim 28 should obviate the rejection.

Claims 1, 3, 4, 7-10, and 12-16 are rejected by the Examiner under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The applicants amendments to claim 1 which identifies the bilayer comprising a first layer of a first material and a second layer of a second material different from the first material should clarify the claims.

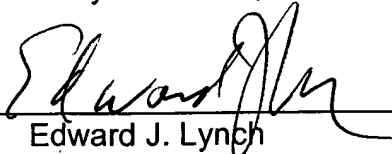
### **Response to Allowable Subject Matter**

Applicants note with appreciation the indication that Claims 9 and 10 would be allowable if rewritten to overcome the rejections under 35 U.S.C. §112, second paragraph. The allowance of claims 18, 19 and 21-26 is likewise appreciated.

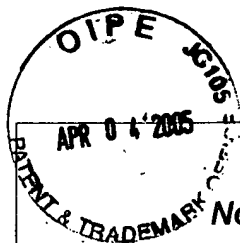
### **Conclusions**

The applicants believe that all of the pending claims are directed to patentable subject matter. Reconsideration and an early allowance are respectfully requested.

Respectfully submitted,

By:   
Edward J. Lynch  
Registration No. 24,422  
Attorney for Applicants

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# Notice of Allowability

Application No.

09/375,169

Examiner

Jennifer C McNeil

Applicant(s)

AITA ET AL.

Art Unit

1775

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 10/12/04.
2. ☒ The allowed claim(s) is/are 1,3,4,7-10,12-16,18,19,21-26,28,30 and 33.
3. ☒ The drawings filed on 08/16/99 are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) ☐ All b) ☐ Some\* c) ☐ None of the:
    1. ☐ Certified copies of the priority documents have been received.
    2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.  
**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
  6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
    - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
      - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date \_\_\_\_\_.
    - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

## Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date \_\_\_\_\_
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date \_\_\_\_\_
7. ☐ Examiner's Amendment/Comment
8. ☐ Examiner's Statement of Reasons for Allowance
9. ☐ Other \_\_\_\_\_

  
**JENNIFER MCNEIL**  
**PRIMARY EXAMINER**